

IN THE CLAIMS

1. (Previously presented) A digital image display system, comprising:
a plurality of Light Emitting Diodes (LEDs) forming a display panel for displaying a digital image, at least some of the LEDs of the display panel capable of sensing light when in a sense mode and emitting light to create a portion of the digital image when in an emit mode;
a driving circuit to drive at least some of the LEDs;
a sensing circuit to sense light received at some of the LEDs;
a switch coupled with the driving circuit, sensing circuit and some of the LEDs, to switch some of the LEDs from the sense mode to the emit mode; and
a feedback controller coupled with the sensing and driving circuits, the feedback controller to adjust the brightness of an LED in response to the amount of light sensed by that LED;

wherein:

the sensing circuit is coupled to a first LED;

the sensing circuit comprises:

a reverse biasing circuit coupled to a first terminal of the first LED; and

a sensing circuit coupled to a second terminal of the first LED;

the driving circuit is coupled to the first LED; and

the driving circuit comprises a forward driving circuit coupled to the second terminal of the first LED.

2. (Previously presented) The display system of claim 1 wherein the plurality of LEDs are operable in the emit mode and in the sense mode.

3. (Original) The display system of claim 1 wherein one or more of the plurality of LEDs comprises an organic material.

4. (Previously presented) The display system of claim 1 wherein the sensing circuit comprises a reverse bias circuit coupled to some of the plurality of LEDs.

5. (Previously presented) The display system of claim 1 wherein the sensing circuit is configurable to sense an amount of light energy received by each of the plurality of LEDs.

6. (Previously presented) The display system of claim 1 wherein the sensing circuit can sense an amount of light energy generated from outside the display panel.

7. (Cancelled)

8. (Currently Amended) The display system of claim 1 [[7]] further comprising:
a first switch coupled to the first terminal of the first LED, the reverse biasing circuit, and a power supply; and

a second switch coupled to the second terminal of the first LED, the sensing circuit, and the forward driving circuit;

wherein:

when the first LED is in the sense mode, a first path is formed between the reverse biasing circuit and the sensing circuit through the first switch, the first LED, and the second switch; and

when the first LED is in the emit mode, a second path is formed between the driving circuit and a power supply through the first switch, the first LED, and the second switch.

9. (Previously presented) The display system of claim 1 wherein:
the LEDs are grouped into a plurality of groups;
for each group of LEDs, the driving circuit is configured to drive the LEDs of the group when the group is in the emit mode;
for each group of LEDs, the sensing circuit is configured to sense an amount of light sensed by at least one of the LEDs of the group when the group is in the sense mode; and
for each group of LEDs, the feedback controller is configured to adjust a drive level for each LED of the group in response to the amount of light sensed by the at least one of the LEDs of the group.

10. (Previously presented) The display system of claim 9 wherein:
the LEDs are arranged in rows in the display panel; and
each row of LEDs of the display panel is one of the groups of LEDs.

11. (Previously presented) The display system of claim 1 wherein in a first mode the driving circuit is coupled to a first row of LEDs while the sensing circuit is coupled to a second row of LEDs adjacent to the first row of LEDs, and in a second mode the driving circuit is coupled to the second row of LEDs and the sensing circuit is coupled to the first row of LEDs, wherein each LED can adjust its brightness in the emit mode in response to the amount of light sensed by that LED in the sense mode.

12. (Previously presented) The display system of claim 1, further comprising:
an LED brightness adjusting circuit coupled to both the sensing circuit and the driving circuit, and configured to modulate a brightness of an output of a first LED in the display panel operable in the emit mode based on a signal received from a second LED in the display panel operable in the sense mode.

13. (Previously presented) The display system of claim 12 wherein the first LED of the display panel operable in the sense mode is configured to sense light from a source external to the display panel.

14. (Previously presented) The display system of claim 12 wherein the first LED of the display panel operable in the sense mode is configured to sense light from the second LED in the display panel operable in the emit mode.

15. (Original) The display system of claim 1, further comprising:
a uniformity calibration circuit coupled to both the sensing circuit and the driving circuit, and configured to adjust the output of an LED in the display panel operable in the emit mode based on the output of another LED in the display panel operable in the emit mode that is sensed by an LED in the display operable in the sense mode.

16. (Original) The display system of claim 15 wherein the uniformity calibration circuit is a gamma uniformity calibration circuit and is operable to adjust the output of the LED in the display panel operable in the emit mode over a range of output intensities.

17. (Original) The display system of claim 1, further comprising:
a position circuit coupled to the sensing circuit and structured to determine a position on the display panel at which an external light source is pointing.

18. (Previously presented) The display system of claim 17 wherein the position circuit is configured to compare amounts of light sensed by one or more LEDs in the display panel sensed during the sense mode to determine the position on the LEDs of the display panel at which the external light source is pointing when the external light source is pointing at at least one LED of the display panel.

19. (Original) The display system of claim 17, further comprising an image generator coupled to the position circuit, the image generator structured to generate an image responsive to an output from the position circuit.

20. (Original) The display system of claim 1 wherein one or more of the plurality of LEDs are Stacked Organic Light Emitting Diodes (SOLED).

21. (Original) The display system of claim 1 wherein one or more of the LEDs of the display panel operable in the sense mode are Stacked Organic Light Emitting Diodes (SOLEDs).

22. (Original) The display system of claim 21, wherein the sensing circuit comprises a plurality of separate layer sensing circuits respectively coupled to separate organic layers in the one or more SOLEDs, and wherein the sensing circuit is structured to signal from which of the separate organic layers in the one or more SOLEDs light energy is being sensed.

23. – 27. (Cancelled)

28. (Currently Amended) A method for operating a digital image display system that includes a display device having a plurality of diodes, each diode structured to generate electroluminescent light to create a portion of the digital image in an emit mode, and each diode structured to sense light energy incident on the diode in a sense mode, the method comprising, for at least one diode:

sensing the light energy incident on the diode in the sense mode, including:

reverse biasing the diode through a first terminal of the diode; and

sensing the light energy incident on the diode through a second terminal of the diode;

adjusting an associated drive level in response to the sensed light energy incident on the diode; and

driving the diode in response to an associated drive level in the emit mode, including

forward biasing the diode through the second terminal of the diode;

wherein the emit mode and the sense mode for the diode are mutually exclusive.

29. (Previously presented) The method of claim 28 wherein sensing the light energy incident on a first diode and driving a second diode occurs substantially simultaneously.

30. (Previously presented) The method of claim 28 wherein:

driving each diode occurs during a first portion of a display cycle;

sensing the light energy incident on each diode occurs during a second portion of the display cycle; and

time periods for the first portion of the display cycle and the second portion of the display cycle are mutually exclusive.

31. (Previously presented) The method of claim 30 wherein each diode is both driven in the first portion of the display cycle and senses light energy in the second portion of the display cycle.

32. (Previously presented) The method of claim 28 wherein sensing the light energy incident on the diode comprises sensing an amount of light energy generated by diodes in the emit mode.

33. (Previously presented) The method of claim 28, further comprising: adjusting an overall brightness of the display device based on the amount of light energy falling on diodes in the sense mode.

34. (Original) The method of claim 33 wherein adjusting an overall brightness of the display comprises modulating a signal used to drive the diodes structured to generate light.

35. (Cancelled)

36. (Previously presented) The method of claim 28 wherein adjusting a driving signal used for driving the diode comprises adjusting a driving signal used for driving that diode at several points along a gamma curve of the particular diode.

37. (Previously presented) The method of claim 28, further comprising detecting a position on the display device of where an external pointing device is incident on at least one of the diodes.

38. (Original) The method of claim 37 wherein the external pointing device is a laser pointer.

39. (Previously presented) The method of claim 37, further comprising generating an image on the display device based on a detected position of the external pointing device.

40. (Previously presented) The system of claim 1, further comprising: a storage circuit structured to store a first value indicating light incident on a LED sensed by the sensing circuit during a first period; and a comparator structured to compare a

second value indicating light incident on the LED sensed by the sensing circuit during a second period to the first value.

41. (Previously presented) The system of claim 40, further comprising a locator circuit coupled to the comparator and structured to determine a position of a light source shining on the display panel in response to the comparison of the first value and the second value.

42. (Previously presented) The system of claim 40, wherein the storage circuit comprises:

a plurality of values indicating light incident on each of the plurality of LEDs.

43. (Previously presented) The system of claim 40 wherein the storage circuit comprises permanent data storage.

44. (Previously presented) The system of claim 42 wherein the storage circuit comprises data stored during the manufacture of the display.

45. (Previously presented) The system of claim 1 wherein the driving circuit comprises a multiplexer structured to power some of the plurality of LEDs in sequence.

46. (Currently Amended) A position determiner for an OLED display, comprising:
a plurality of diodes located in columns and rows, the plurality of diodes operable in both an emitting and a sensing mode;
driving circuitry coupled to the plurality of diodes and structured to drive diodes in the emitting mode so as to cause an image to be shown on the display;
sensing circuitry coupled to the plurality of diodes and structured to cause diodes to be in the sensing mode and to generate data signals when the diodes are in the sensing mode indicative of energy sensed by the diodes;
a switch for switching the diodes between sensing and emitting modes;
a data storage unit structured to store the data signals generated when the diodes are in the sensing mode;

a position locator coupled to the data storage unit and including a comparator structured to compare data sensed by a diode in the sensing mode, the position locator structured to determine a position on the diodes at which an external pointing device is pointing in response to the compared data;

wherein:

the sensing circuitry is coupled to a first diode of the plurality of diodes;

the sensing circuitry comprises:

a reverse biasing circuit coupled to a first terminal of the first diode; and

a sensing circuit coupled to a second terminal of the first diode;

the driving circuitry is coupled to the first diode; and

the driving circuitry comprises a forward driving circuit coupled to the second terminal of the first diode.

47. (Previously presented) The position determiner of claim 46, wherein the position locator is structured to compare data retrieved from the data storage unit to the data signals.

48. (Currently Amended) A digital image display device for creating a digital image comprising:

a Light Emitting Diode (LED) capable of sensing and emitting light to form a part of the image;

a driving circuit coupled with the LED to drive the LED to form the image part;

a sensing circuit coupled with the LED to sense light received at the LED;

a switch coupled with the driving circuit, sensing circuit and the LED, the switch to periodically switch the LED from a sense mode to an emit mode;

a memory for storing a value related to the brightness of the light sensed when the diode is in the sense mode;

a feedback controller coupled with the sensing and driving circuits and with the memory, the feedback controller to adjust the brightness of the LED when forming the image part in response to the stored value;

wherein:

the sensing circuit comprises:

a reverse biasing circuit coupled to a first terminal of the LED; and
a sensing circuit coupled to a second terminal of the LED;
the driving circuit comprises a forward driving circuit coupled to the second
terminal of the LED.

49. (Previously presented) The apparatus of claim 48 further comprising a gamma uniformity calibration circuit to adjust the output of the LED over a range of output intensities.

50. (Previously presented) The apparatus of claim 48 wherein the LED is a stacked organic LED (SOLED).

51. (Previously presented) The apparatus of claim 50 wherein the sensing circuit comprises a plurality of separate layer sensing circuits respectively coupled to separate organic layers in the SOLED, and wherein the sensing circuit is structured to signal from which of the separate organic layers in the SOLED light energy is being sensed.

52. (Previously presented) The digital image display system of claim 1 wherein the switch is constructed and arranged for periodic switching between the sense mode and the emit mode.

53. (Previously presented) The digital image display system of claim 52 wherein the display system further includes a memory for storing a value related to the brightness of the light sensed when one of the diodes is in a sense mode.

54. (Previously presented) The digital image display system of claim 53 wherein the feedback controller uses the value stored in the memory to adjust the brightness of the LED.

55. (Previously presented) The method of claim 28 further comprising switching at least one diode between the sense mode and the emit mode at least several thousand times per second.

56. (Previously presented) The method of claim 55 further comprising for the at least one diode, storing a value related to the sensed light energy.

57. (Previously presented) The method of claim 56 wherein driving the diode comprises driving the diode based on the stored value.

58. (New) A digital image display system, comprising:

- a plurality of Light Emitting Diodes (LEDs) forming a display panel for displaying a digital image, at least some of the LEDs of the display panel capable of sensing light when in a sense mode and emitting light to create a portion of the digital image when in an emit mode;
- a driving circuit to drive at least some of the LEDs;
- a sensing circuit to sense light received at some of the LEDs;
- a switch coupled with the driving circuit, sensing circuit and some of the LEDs, to switch some of the LEDs from the sense mode to the emit mode; and
- a feedback controller coupled with the sensing and driving circuits, the feedback controller to adjust the brightness of an LED in response to the amount of light sensed by that LED;

wherein in a first mode the driving circuit is coupled to a first row of LEDs while the sensing circuit is coupled to a second row of LEDs adjacent to the first row of LEDs, and in a second mode the driving circuit is coupled to the second row of LEDs and the sensing circuit is coupled to the first row of LEDs, wherein each LED can adjust its brightness in the emit mode in response to the amount of light sensed by that LED in the sense mode.

59. (New) The display system of claim 58 wherein:

- the sensing circuit is coupled to a first LED;
- the sensing circuit comprises:
 - a reverse biasing circuit coupled to a first terminal of the first LED; and
 - a sensing circuit coupled to a second terminal of the first LED;
- the driving circuit is coupled to the first LED; and
- the driving circuit comprises a forward driving circuit coupled to the second terminal of the first LED.

60. (New) The display system of claim 58, further comprising:
a position circuit coupled to the sensing circuit and structured to determine a position on
the display panel at which an external light source is pointing.
61. (New) The display system of claim 60 wherein the position circuit is configured
to compare amounts of light sensed by one or more LEDs in the display panel sensed during the
sense mode to determine the position on the LEDs of the display panel at which the external light
source is pointing when the external light source is pointing at at least one LED of the display
panel.